

3000A 20V DC Rectifier for Anodizing & Metal Finishing

1.Specifications:

Input parameters: Three-phase AC380V \pm 10% 50 Hz, three-phase unbalance \leq 5%

Output parameters: DC 0~20V 0~3000A

Output mode: Ordinary direct current

Cooling method: Water cooling

Power supply type: IGBT-based power supply

Application Industry: Surface treatment industry, such as anodizing and oxidation of aluminum profiles.

2.Product Description

In an 3000A 20V DC Rectifier for Anodizing & Metal Finishing, after the AC input voltage is filtered by a rectifier circuit, high-voltage DC power is obtained. The "variable frequency conversion" stage inverts this high-voltage direct current into approximately 30kHz high-frequency alternating current. This high-frequency AC is then transformed into secondary voltage via a high-frequency transformer and filtered through a high-frequency rectifier circuit to produce the required output voltage. The electroplating rectifier power supply employs a control circuit to sample output voltage and current. These sampled signals undergo closed-loop feedback to generate pulse width modulation (PWM) signals, which regulate the inverter circuit and maintain stable output voltage/current - a critical requirement for precision electroplating applications.

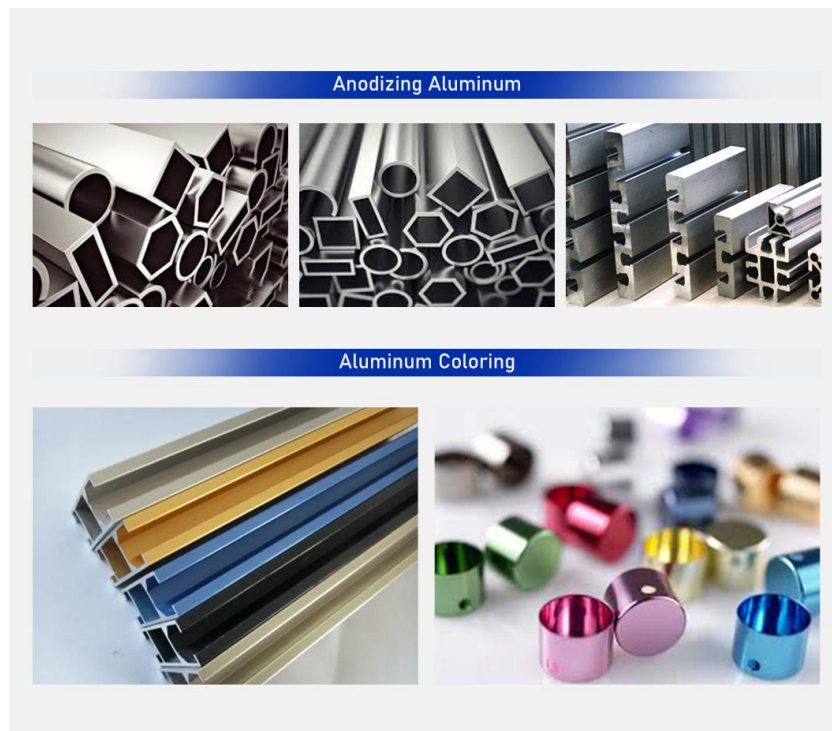
3.Product Applications

Anodizing Rectifier drives the electrochemical formation of aluminum's oxide layer (Al_2O_3), critical for industrial applications demanding corrosion resistance and structural integrity. By delivering stable current outputs, it enables uniform growth of protective coatings with adjustable thickness (5–25 μm), essential for automotive trim exposed to road salts or marine-grade architectural window frames. The technology ensures surfaces achieve 500–900 HV hardness for scratch-resistant smartphone casings while maintaining dielectric properties for heat sink insulation in 5G equipment. Post-anodizing, the rectifier-compatible sealing process locks in organic dyes for fade-resistant facade panels and medical device markings. Its adaptive voltage control (12–120V DC) supports both Type II decorative finishes on consumer electronics and Type III hard coatings for aircraft landing gear components, achieving 60% faster cycle times versus traditional rectifiers through pulsed current optimization.

1)Field application diagram:



2) Industry application examples:



4. Technology Advantages

- › A very thin coating
- › Excellent corrosion protection
- › Good electrical insulator
- › Fade resistant in sunlight
- › Environmentally friendly finish
- › Inexpensive
- › Extremely durable, hard, abrasion resistant and long lasting

5. Role of Anodizing

Corrosion Resistance

Forms a protective oxide barrier against saltwater, chemicals, and atmospheric exposure, critical for marine hardware, aircraft components, and automotive underbody parts.

Surface Hardening

Achieves 300–500 HV surface hardness (vs. ~100 HV for bare aluminum), ideal for hydraulic systems, machinery guides, and industrial tooling requiring wear resistance.

Aesthetic Customization

Enables dyeing (organic/inorganic pigments) and electrolytic coloring for architectural façades, consumer electronics casings, and luxury packaging.

Electrical Insulation

Provides dielectric strength (15–25 V/μm) for heat sinks, PCB enclosures, and power distribution components needing non-conductive surfaces.

Adhesion Promotion

Microporous structure enhances bonding for powder-coated window frames, adhesive-mounted automotive trims, and composite aerospace panels.

Abrasion Resistance

Extends service life of conveyor components, firearm parts, and offshore rig equipment exposed to sand, grit, or high friction.

Thermal Management

Improves heat dissipation in LED housings, server racks, and EV battery trays via oxide layer's emissivity ($\epsilon \approx 0.7\text{--}0.8$).

6.Types of Anodizing

Anodizing rectifiers supply regulated current and voltage to electrochemically generate aluminum oxide layers, with core models such as the Aluminum

Anodizing Rectifier (hard coating) and DC/AC Coloring Rectifier (integrated dyeing), each engineered for distinct process parameters.

› Aluminum Anodizing Rectifier

Function: Delivers direct current (DC) to form a protective oxide layer on aluminum.

Features:

Precise Voltage Control: Ensures optimal oxide film formation.

Stable Current: Prevents defects like uneven layers.

Energy Efficient: High-frequency switching technology reduces energy use.

Applications: Used in aerospace, automotive, and construction for corrosion-resistant aluminum products.

› DC/AC Coloring Rectifier

Function: Allows for both DC and AC currents to enable precise color effects in anodizing while maintaining the oxide layer's integrity.

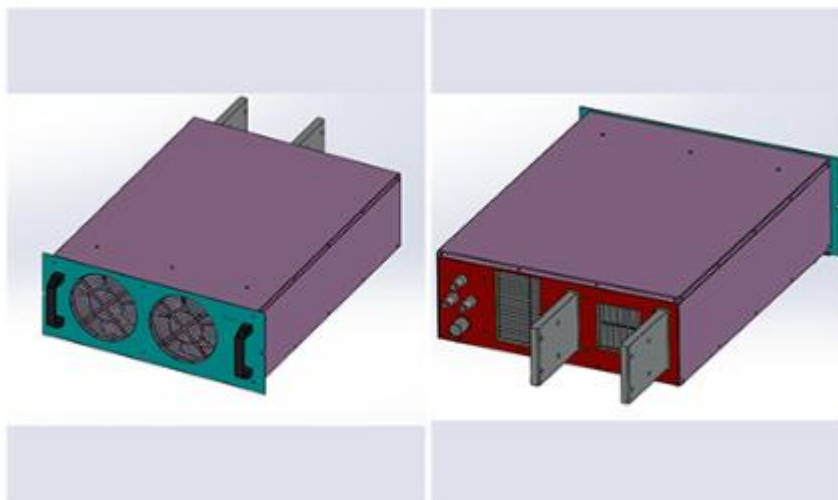
Features:

Dual Current Output: Enables fine control over color development.

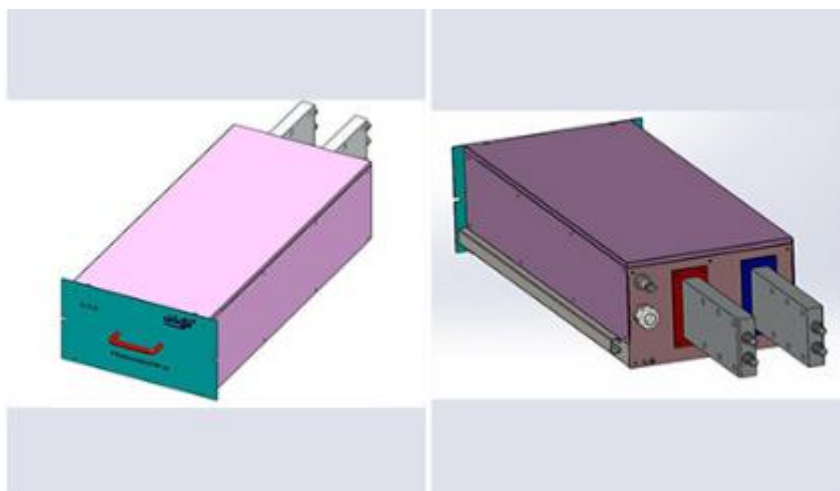
Energy Efficiency: High-frequency switching reduces energy consumption.

These rectifiers ensure efficient, high-quality anodizing results tailored to industry needs.

7.Cooling Type for Anodizing



Air Cooling: Heat dissipation fan + air duct + comb heat sink



Water Cooling: Built-in water circulation line

8. Technical Parameters

Type of characteristics	Parameters	Technical Requirements
Input characteristics	Rated input voltage	Three-phase AC380V $\pm 10\%$ 50 Hz, three-phase unbalance $\leq 5\%$ Compliance with National Power Quality Standards
	Rated input current	AC 67.2A
	Rated input power	102KVA
	Rated input power factor	$\cos\phi \geq 0.95$
Output characteristics	Output voltage	DC 0~20V adjustment
	Output current	DC 0~3000A adjustment
	Precision of steady current	$\leq 1\%$
	Precision of stable voltage	$\leq 1\%$
	Displayed precision	1A, 0.01V
	Current ripple coefficient	$\leq 3\%$ ($I \geq 50\%I_d$)
	Rated output power	$\geq 94\%$
Insulation characteristic	Insulation resistance	Input - Output: $\geq 5M\Omega$
		Input - Cabinet: $\geq 5M\Omega$
		Output - Cabinet: $\geq 5M\Omega$
Protective characteristics	With self-protection function under non-normal cases such as over-voltage, over-current, overload, short circuit and overheating	
Other characteristics	Noise	$\leq 50dB$
	Running state	Continuous full load run of product
	Load level	Level II
	Insulation grade of the transformer	Grade B

9.Solution

Liyuan will keep up with the world's latest technology closely, and uphold the concept of providing customers with high-quality power supplies and professional integrated services.

With advanced design and rich experience in rectifier manufacturing, we will provide the best power solutions as well as the most stable and efficient power supply for users both at home and abroad.

10.Technical Capability

LIYUAN rectifier is the most competitive brand in China

Company relies on strong technology research and development cooperation basis, created a number of advanced technology, in recent 3 years amounted to more than 30 to apply for a patent, which has nearly 10 patents of invention. Equipped with the national electric power transformation and control engineering technology research center (branch), and has set up a loan enterprise academician workstation.

Strict implementation of ISO quality management system, and through the CE safety certification, has been implementing ERP management for many years, to achieve the network, systematic computer control, the formation of a standard, efficient modern management system.

11.Qualification certification

Liyuan adhere to innovation and the continuous improvement of power conversion efficiency and product quality.

The increasing R&D investment every year, and cooperation with China's well-known universities, we has established the research center of national electric power conversion and control engineering technology.

Especially the related core patents of high-power synchronous rectifier power supply, stay ahead of the whole industry in China.

The ISO 9001 quality management system has been fully implemented in Liyuan, including quality inspection of components in warehouse, production process inspection, and final product inspection.

We adopt advanced scientific quality management system and the most stringent testing methods in the whole process to ensure the stability and reliability of products.



12. Service

Packing

- 1) Small size rectifier packing in carton box separately.
- 2) Large size rectifier will be packed in wooden case.
- 3) We guarantee that all the packing is intact when it reaches its destination.

Shipping

- 1) 30-45 Days after payment.
- 2) Transport: DHL, FEDEX, UPS, Air shipping, Boat shipping
- 3) You may choose our shipping partner or your own partner.

Maintenance

We are pleasant to share our theory and experience on equipment maintenance with users.

We are pleasant to interact with users to collect their tips and know-hows on equipment maintenance.

The module "Maintenance" here is intended to help users solve various

problems they possibly encounter during equipment maintenance...

If you need other power anodizing rectifiers, we can custom design them according to customer requirements. Please contact us.

Seeking 3000A 20V DC rectifier for anodizing & metal finishing? Liyuan Haina Rectifier, a professional manufacturer with 27+ years specializing in industrial rectifiers, supplies global clients including the United States, Canada, Britain, Italy, Spain, South Africa, Russia, the UAE, Japan, South Korea, Malaysia, etc. Our advanced factory delivers cost-effective Made-in-China solutions, with competitive prices and customizable options. Contact us for sales inquiries.